

REMARKS

The Examiner's Action mailed November 17, 2004 has been received and its contents carefully considered.

Claims 11-29 are currently pending. Claims 11 and 27 are amended herein. Claims 11, 26 and 27 remain the independent claims in this application.

The Applicant notes with appreciation the Examiner's indication that claim 26 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. §112, second paragraph, set forth in the Office Action. The Applicant also notes with appreciation the Examiner's indication that claims 14-20, 22-25 and 28-29 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. §112, second paragraph, set forth in the Office Action, and to including all of the limitations of the base claim and any intervening claims.

In the Action, claims 11 and 13-29 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particular point out and distinctly claim the subject matter which the applicant regards as the invention. Specifically, the Examiner asserts that claims 11 and 26-27 recite an image forming device but do not recite an image forming means, that claim 17 recites a revolution number but does not recite a means that obtains this number, that claim 19 recites that the image forming apparatus uses records of image density but does not recite a means of storing these records, and that claim 25 recites an average printing temperature but does not recite a means to obtain this temperature.

The Examiner's rationale for the §112 rejection of claims 11 and 26-27 is not entirely understood. The present application discloses "the photo-sensitive drum 1, the developing roller 7 etc. comprises a developing means" and "[t]he photo sensitive drum 1 functions as a holder of an image while it rotates in the direction indicated by the arrow shown in the drawing, and it plays a central role in the image forming apparatus" (page 7, lines 13-14 and 24-26). Thus, it would appear that the "developing means" recited in the claims is functionally equivalent to an "image forming means," which the Examiner asserts is missing. To clarify this equivalence, claims 1 and 26-27 are each amended herein to recite, "developing material to be transferred onto an image holder of said developing means" (added language emphasized).

In response to the Examiner's concern regarding the "revolution number" recited in claim 16 (not claim 17 as stated in the Action), the claim is amended to clarify that "said operation amount detecting means detects said amount of operation according to a measured number of revolutions of said image holder" (amended language emphasized). This suggests that the recited operation amount detecting means includes the capability of measuring the number of revolutions of the image holder. A similar change is made in claim 28.

The Examiner's concern regarding claim in 19 is addressed by amending the claim to recite that the records of image density detected by the image density detecting means are "stored in a memory." The rejection of claim 25 is addressed by amending it to depend from claim 23, rather than claim 11, thus providing an appropriate antecedent for the recited "average printing temperature."

In view these various changes to the claim language, the Examiner is respectfully requested to reconsider the claims and withdraw the §112 rejection.

In the Action, claims 11-13, 21 and 27 are rejected under 35 U.S.C 103(a) as being anticipated by Shimazaki et al. (U.S. Patent No. 6,134,397) in view of Fujino (JP 411125938 A). For at least the following reasons, it is respectfully submitted that the claims, as amended herein, patentably distinguish over the applied prior art references, whether considered individually or in combination.

There are three principal features of the present invention that are disclosed in the specification and emphasized in the independent claims. The first feature is to detect the image density from image data for the image being presently developed, such as the dot number in a prescribed area, a sheet of A4 paper, for example. By adjusting the voltages of the developing roller and the developing material supplying roller using this density data at the time of printing, a clear printing can be obtained each time. Generally, it is necessary to increase the voltage difference between the developing roller and the developing material supplying roller as the density of the original image becomes greater. This feature is recited in amended claim 11.

The second feature concerns memory capacity. The first setting value for deciding the first voltage is a single value. The plurality of values for deciding the second voltage are voltage differences. Each one of this plurality of values has a small magnitude, and

therefore, a large memory area is not required for storing these values. Thus, adequate density control can be obtained by using a controller that is rather simple and inexpensive. This feature is the basis of claim 26.

The third feature is to use what is referred to as "an amount of operation", for controlling voltage, as a principal parameter. Thereby, appropriate control of image density can be obtained. This feature is recited in amended claim 27.

Unlike the present invention, the Shimazaki reference discloses a developing device in which developing bias is determined according to a prescribed density setting value being set by an operator beforehand. Fujino discloses a cleaning device having a cleaning bias control means for controlling the electricity source (cleaning bias power source) applied to a cleaning blade, which cleans residual toner from a photo-sensitive drum. This cleaning device is different in structure and purpose from the developing device to which the present invention is directed. Moreover, in Fujino, when density data detected from the image data indicates low density, a cleaning bias voltages is set high, to prevent a titanium oxide residual toner from flowing through the cleaning device. On the other hand, when the density data detected from the image data indicates high density, the cleaning bias voltage is set low to prevent the charging up of toner remaining in the vicinity of the cleaning blade. It is respectfully submitted that these prior art references, whether considered individually or in combination, fail to teach or suggest the principal features set forth in rejected claims 11 and 27. Our analysis follows.

Shimazaki determines developing bias according to a prescribed density setting value when an operator sets a density. Then it determines an electric potential difference between the toner supplying roller and the developing roller according to said developing bias (column 4, lines 58-63). In other words, Shimazaki determines bias voltage based on an operator's setting value inputted beforehand. Thus, Shimazaki, as acknowledged by the Examiner, fails to disclose an image density detecting means for detecting image density from image data, as claim 11 requires. As a result, adequate toner supply cannot be assured. Moreover, Shimazaki cannot restrain deterioration of printed images resulting from an amount of operation of the apparatus because voltage correction according to the amount of operation is not performed, as claim 27 would require.

The Examiner relies on Fujino to overcome the acknowledged failure of Shimazaki to disclose an image density detecting means for detecting image density from image data. However, Fujino fails to teach or disclose use of the density data to control the developing bias voltage and the developing material supplying bias voltage. Fujino teaches only a method to control cleaning bias based on a density of the image data. The method is to set the bias high when the density is low and to set the bias level when the density is high. This method is effective only for cleaning devices to prevent residual toner for flowing from the green device and to prevent over-electrification. Therefore, contrary to the Examiner's position, it is submitted that a person of ordinary skilled in the art would not be motivated to apply Fujino to Shimazaki for the invention addressed by claim 11, where an adequate control of toner flow for a developing device is required.

Moreover, Fujino determines a cleaning bias based on density data detected at the time of forming an image. It does not teach a method to determine a bias based on accumulated image data or accumulated density data. Therefore, contrary to the Examiner's position, it is submitted that a person of ordinary skilled in the art would not be motivated to apply Fujino to Shimazaki for the invention addressed by claim 27, where an adequate control of toner flow for a developing device according to aging of the device is required.

In order to further distinguish over the applied references, claim 11 is amended herein to add the limitation "so that a difference between a first voltage provided by said first electricity source and a second voltage provided by said second electricity source becomes larger as said image density detected by said image density detecting means increases and becomes smaller as said image density detected by said image density detecting means decreases," and claim 27 is amended to make it clear that the operation amount detecting means detects an amount of operation "with respect to images previously developed." Thus, even if the references were combined as suggested by the Examiner, the combination would not produce the claimed invention.

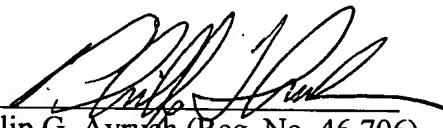
The Applicant submits that claims 12-25 and 28-29 are allowable for at least the reason that they depend from claims 11 and 27, respectively.

The Examiner's rejections having been addressed by the amended claims, it is respectfully submitted that this application is now in condition for allowance. Notice of allowance and the passing of this case to issue, with claims 11-29, are earnestly solicited.

Should the Examiner feel that a conference would help to expedite the prosecution of this application, the Examiner is hereby invited to contact the undersigned counsel to arrange for such an interview.

Respectfully submitted,

March 15, 2005
Date


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